

#777

IRAS
IR Telescope
ISSA Galactic Plane Maps

83-004A-Oly

IRAS

ISSA GALACTIC PLANE MAPS

83-004A-01Y

This data set consists of one 8 mm tape. The FITS files are written to tape using TAR. The FITS headers are written in ASCII and the data are in binary form. The TAR listing, stating the size, name of the files, and the generation date of each file is included on the following pages. The C tape is a 4 mm tape written in the same format. The D and C numbers along with the number of files are as follows:

D#	C#	FILES	File Name
-----	-----	-----	-----
D-108361	C-032398	1	plate-000-b1.fits plate-000-b2.fits plate-000-b3.fits plate-000-b4.fits plate-045-b1.fits plate-045-b2.fits plate-045-b3.fits plate-045-b4.fits plate-090-b1.fits plate-090-b2.fits plate-090-b3.fits plate-090-b4.fits plate-135-b1.fits plate-135-b2.fits plate-135-b3.fits plate-135-b4.fits plate-180-b1.fits plate-180-b2.fits plate-180-b3.fits plate-180-b4.fits plate-225-b1.fits plate-225-b2.fits plate-225-b3.fits plate-225-b4.fits plate-270-b1.fits plate-270-b2.fits plate-270-b3.fits plate-270-b4.fits plate-315-b1.fits plate-315-b2.fits plate-315-b3.fits plate-315-b4.fits

William H. Waller
StarStuff Incorporated
NASA/GSFC, Code 681
Greenbelt, MD 20771

Dr. David T. Leisawitz
NSSDC, Code 631
NASA/GSFC
Greenbelt, MD 20771

May 30, 1995

Dear Dr. Leisawitz,

It is with great pleasure that I submit the enclosed data tape for archiving at the National Space Sciences Data Center. The exabyte tape contains 32 mosaic images of the far-infrared emission from the Milky Way. These images comprise the major "deliverable" resulting from the ADP proposal "Fine-Scale Structure in the Far-Infrared Milky Way" (W. H. Waller, P.I.) as implemented through NASA Contract #NAS5-32591 to StarStuff Incorporated.

The data tape contains 8 mosaic images for each of the 4 IRAS bandpasses (12, 25, 60, and 100 microns). The 8 contiguous mosaics are separated by 45° in Galactic longitude, with approximate dimensions of $60^\circ \times 60^\circ$ in longitude and latitude at a pixel scale of $0.05^\circ \times 0.05^\circ$. In this way, the entire Milky Way is covered with overlaps of approximately 7.5° between images. The value of each pixel is in units of MJy/Sr.

The mapping projection of each mosaic image is gnomonic (tangent plane), meaning that the total range in latitude changes from $\pm 29.5^\circ$ through the center of the image to $\pm 27.9^\circ$ along the sides. Re-projection to rectangular or other coordinate systems can be done using image processing routines in IDL, AIPS, IRAF or equivalent astronomical software packages. If only one or two mosaics at a different projection is desired, I would recommend that the investigator use the *SkyView* "advanced" interface on the World Wide Web. Its URL is (<http://skview.gsfc.nasa.gov/skyview.html>).

The FIR mosaics were made from the IRAS Sky Survey Atlas images, and so repre-

sent a culmination of the latest processing of the IRAS data (Wheelock *et al.* 1994). The re-processing involved co-addition of the individual HCON images, de-striping on multiple scales, and removal of the zodiacal emission component. The resulting mosaics have considerably higher S/N than the BIGMAP mosaics that preceded them. They also extend nearly 3 times farther in Galactic latitude.

The mosaicing was done by Gaylin Laughlin and Rick Ebert at the Infrared Processing and Analysis Center (IPAC) in Pasadena. For a particular mosaic, each subimage was re-projected with respect to a common mosaic "center" and then combined together. Overlapping pixels were averaged together in the combined mosaic. The resulting mosaic images have internally consistent astrometry with little evidence of the mosaicing boundaries (see attached figure).

My colleagues and I have been evaluating the mosaic images in terms of residual artifacts as well as the actual emission morphology. This has involved spatial filtering to bring out the fine-scale structure in the diffuse FIR emission (cf. Waller and Boulanger 1993). We find the following major artifacts...

- 1.) Data are missing in the plate-90 mosaics in a wedge beginning at $(86^\circ, 1^\circ)$ and extending to $(78^\circ \pm 2^\circ, -28^\circ)$, and in the plate-270 mosaics in a more ragged wedge beginning at $(266^\circ, 6^\circ)$ and extending to $(257^\circ \pm 2^\circ, 29^\circ)$. These parts of the sky were never mapped during the 3 confirming surveys which IRAS made (cf. Wheelock *et al.* 1994).
- 2.) Incorrectly subtracted zodiacal emission component. This problem is also described in Wheelock *et al.* (1994). From month to month, the same region in the sky contains a different distribution of interplanetary dust and corresponding zodiacal emission. Therefore, a single zodiacal emission model cannot reproduce that which IRAS detected during its 10-month survey. The largest deviations are apparent in the frames containing the Galactic center and anticenter — where the Ecliptic plane intersects the Galactic plane at an angle of approximately 55° . The 12 and $25\text{ }\mu\text{m}$ bandpasses are most obviously affected, while the $100\text{ }\mu\text{m}$ is least affected (see attached figure).
- 3.) A discontinuity in the surface brightness is evident in the plate-045 mosaics at about

45° longitude. It is especially prominent at around +7° latitude, where a 30% jump is evident. Spatial filtering shows the discontinuity extending towards higher Galactic latitude and lower longitude. Another discontinuity of smaller amplitude is present at negative latitude. It originates near the first discontinuity close to the Galactic plane, again extending towards lower longitude but at a smaller angle wrt the plane. Spatial filtering also reveals a discontinuity in the plate-225 mosaics at (223°, -16°) extending to lower longitudes and more negative latitudes. The same features are present in mosaics made using the *SkyView* interface, indicating that the discontinuities derive from the input ISSA images rather than the particular mosaicing software.

Further information on saturated pixels and hysteresis effects from bright sources, trailing features from solar system debris, mosaicking suitability, as well as the overall photometry of the ISSA images is discussed in the Introduction to Wheelock *et al.* (1994).

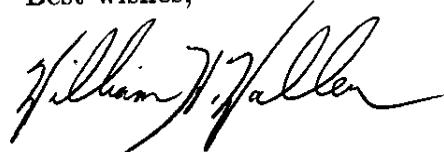
The exabyte datatape was written using a Sun/Unix workstation and the "tar" utility. I have enclosed a listing of the tape's contents. Each image is formatted as a FITS file. The numbers 000, 045, 135, 180, 225, 270, and 315 refer to the longitudes of the image centers. The letters b1, b2, b3, and b4 respectively refer to the 12, 25, 60, and 100 μm bandpasses.

REFERENCES:

- Wheelock, S. L., Gautier, T. N., Chellemi, J., Kester, D., McCallon, H., Oken, C., White, J., Gregorich, D., Boulanger, F., Good, J., and Chester, T. 1994, *IRAS Sky Survey Atlas Explanatory Supplement*, NASA/JPL Publ. 94-11 (JPL: Pasadena).
- Waller, W. H. and Boulanger, F. 1993, "Worms or Froth? Fine-Scale Structure in the Far-Infrared Milky Way," in *Back to the Galaxy*, eds. S. S. Holt and F. Verter, AIP Proceedings Series, **278**, 544.

If you have any further questions, please do not hesitate to contact me.

Best wishes,



William H. Waller

(301) 286-5351

waller@stars.gsfc.nasa.gov

C.C. Gaylin Laughlin, Rick Ebert, Chas Beichman (IPAC/Caltech)

Mike Hauser, Susan Neff, Don West (NASA/GSFC/LASP).

FIGURE CAPTION

Mosaic of far-infrared ($100 \mu\text{m}$) emission from the inner Galaxy. The mosaic was generated from digital versions of the IRAS Sky Survey Atlas (ISSA). It is centered on the Galactic center and has approximate dimensions of $60^\circ \times 60^\circ$ in Galactic longitude and latitude. Many intense star-forming regions (HII regions) highlight the Galactic disk. At positive Galactic latitude, FIR emission from the Ophiucus star-forming cloud blends into the more diffuse “cirrus” emission that pervades the scene. At negative latitude, the “cometary cloud” in Australis is barely visible above the diffuse emission.

Listing of mosaic images on the exabyte tape:

size(bytes)
r---r---r--104/1016765120 Aug 19 14:28 1994 plate-000-b1.fits
r---r---r--104/1016765120 Aug 19 14:28 1994 plate-000-b2.fits
r---r---r--104/1016765120 Aug 19 14:28 1994 plate-000-b3.fits
r---r---r--104/1016765120 Aug 19 14:28 1994 plate-000-b4.fits
r---r---r--104/1016765120 Aug 19 14:32 1994 plate-045-b1.fits
r---r---r--104/1016765120 Aug 19 14:32 1994 plate-045-b2.fits
r---r---r--104/1016765120 Aug 19 14:32 1994 plate-045-b3.fits
r---r---r--104/1016765120 Aug 19 14:32 1994 plate-045-b4.fits
r---r---r--104/1016765120 Aug 19 14:32 1994 plate-090-b1.fits
r---r---r--104/1016765120 Aug 19 14:32 1994 plate-090-b2.fits
r---r---r--104/1016765120 Aug 19 14:33 1994 plate-090-b3.fits
r---r---r--104/1016765120 Aug 19 14:33 1994 plate-090-b4.fits
r---r---r--104/1016765120 Aug 19 14:29 1994 plate-135-b1.fits
r---r---r--104/1016765120 Aug 19 14:29 1994 plate-135-b2.fits
r---r---r--104/1016765120 Aug 19 14:29 1994 plate-135-b3.fits
r---r---r--104/1016765120 Aug 19 14:29 1994 plate-135-b4.fits
r---r---r--104/1016765120 Aug 19 14:29 1994 plate-180-b1.fits
r---r---r--104/1016765120 Aug 19 14:29 1994 plate-180-b2.fits
r---r---r--104/1016765120 Aug 19 14:30 1994 plate-180-b3.fits
r---r---r--104/1016765120 Aug 19 14:30 1994 plate-180-b4.fits
r---r---r--104/1016765120 Aug 19 14:30 1994 plate-225-b1.fits
r---r---r--104/1016765120 Aug 19 14:30 1994 plate-225-b2.fits
r---r---r--104/1016765120 Aug 19 14:30 1994 plate-225-b3.fits
r---r---r--104/1016765120 Aug 19 14:30 1994 plate-225-b4.fits
r---r---r--104/1016765120 Aug 19 14:30 1994 plate-270-b1.fits
r---r---r--104/1016765120 Aug 19 14:31 1994 plate-270-b2.fits
r---r---r--104/1016765120 Aug 19 14:31 1994 plate-270-b3.fits
r---r---r--104/1016765120 Aug 19 14:31 1994 plate-270-b4.fits
r---r---r--104/1016765120 Aug 19 14:31 1994 plate-315-b1.fits
r---r---r--104/1016765120 Aug 19 14:31 1994 plate-315-b2.fits
r---r---r--104/1016765120 Aug 19 14:31 1994 plate-315-b3.fits
r---r---r--104/1016765120 Aug 19 14:32 1994 plate-315-b4.fits

b1 \Rightarrow 12 μ m

b2 \Rightarrow 25 μ m

b3 \Rightarrow 60 μ m

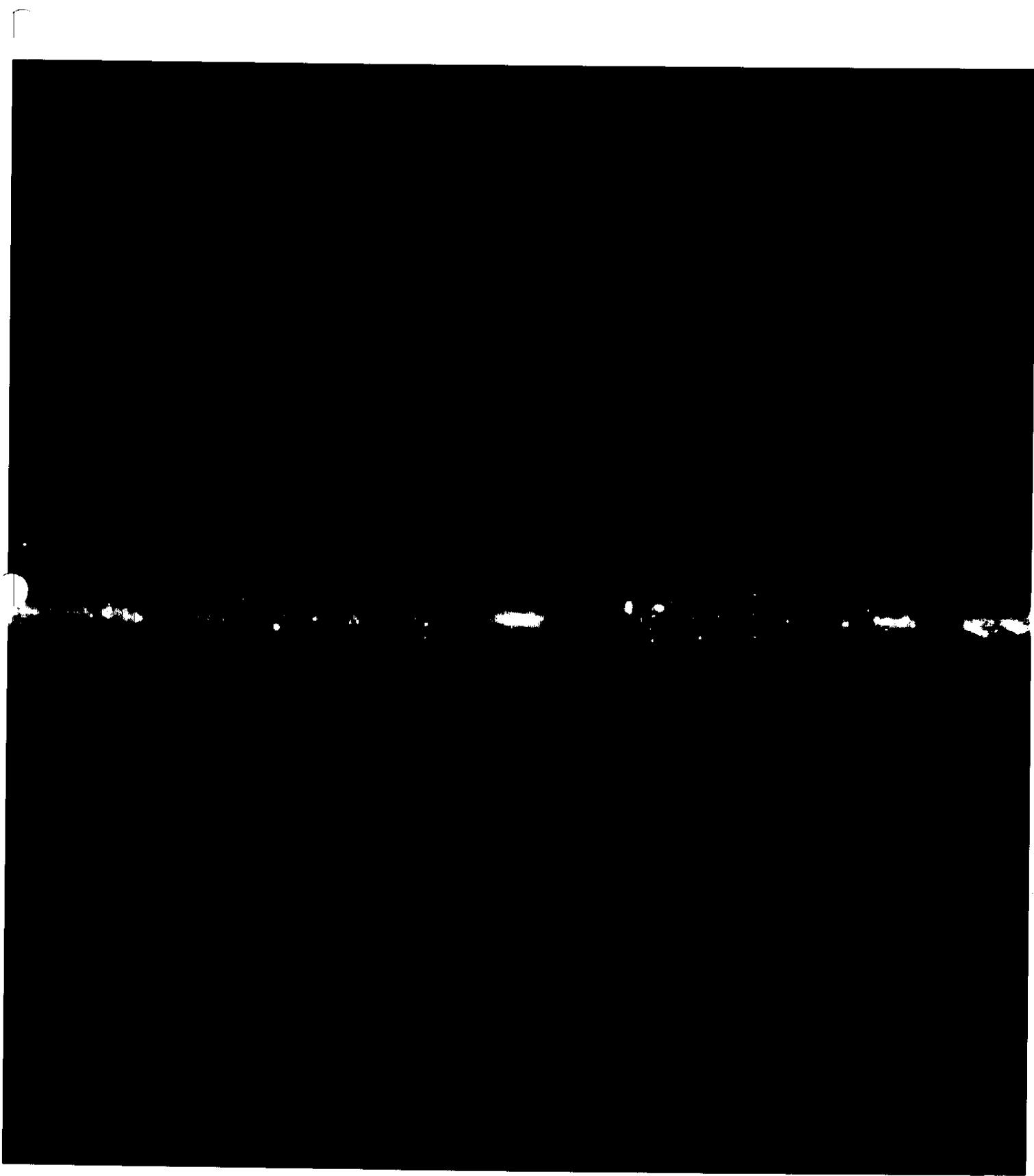
b4 \Rightarrow 100 μ m

To read tape, use --

tar -xvf /dev/NXXXXX 20 *

↑
tape drive name

H.H.Keller
May 1995



444 6765120 Aug 19 18:28:24 1994 plate-000-b1.fits
444 6765120 Aug 19 18:28:35 1994 plate-000-b2.fits
444 6765120 Aug 19 18:28:45 1994 plate-000-b3.fits
444 6765120 Aug 19 18:28:55 1994 plate-000-b4.fits
444 6765120 Aug 19 18:32:11 1994 plate-045-b1.fits
444 6765120 Aug 19 18:32:22 1994 plate-045-b2.fits
444 6765120 Aug 19 18:32:31 1994 plate-045-b3.fits
444 6765120 Aug 19 18:32:40 1994 plate-045-b4.fits
444 6765120 Aug 19 18:32:49 1994 plate-090-b1.fits
444 6765120 Aug 19 18:32:59 1994 plate-090-b2.fits
444 6765120 Aug 19 18:33:08 1994 plate-090-b3.fits
444 6765120 Aug 19 18:33:18 1994 plate-090-b4.fits
444 6765120 Aug 19 18:29:04 1994 plate-135-b1.fits
444 6765120 Aug 19 18:29:14 1994 plate-135-b2.fits
444 6765120 Aug 19 18:29:23 1994 plate-135-b3.fits
444 6765120 Aug 19 18:29:33 1994 plate-135-b4.fits
444 6765120 Aug 19 18:29:42 1994 plate-180-b1.fits
444 6765120 Aug 19 18:29:51 1994 plate-180-b2.fits
444 6765120 Aug 19 18:30:01 1994 plate-180-b3.fits
444 6765120 Aug 19 18:30:10 1994 plate-180-b4.fits
444 6765120 Aug 19 18:30:19 1994 plate-225-b1.fits
444 6765120 Aug 19 18:30:29 1994 plate-225-b2.fits
444 6765120 Aug 19 18:30:39 1994 plate-225-b3.fits
444 6765120 Aug 19 18:30:48 1994 plate-225-b4.fits
444 6765120 Aug 19 18:30:57 1994 plate-270-b1.fits
444 6765120 Aug 19 18:31:07 1994 plate-270-b2.fits
444 6765120 Aug 19 18:31:16 1994 plate-270-b3.fits
444 6765120 Aug 19 18:31:25 1994 plate-270-b4.fits
444 6765120 Aug 19 18:31:34 1994 plate-315-b1.fits
444 6765120 Aug 19 18:31:43 1994 plate-315-b2.fits
444 6765120 Aug 19 18:31:52 1994 plate-315-b3.fits
444 6765120 Aug 19 18:32:01 1994 plate-315-b4.fits

Block Number: 1 (00000001), 10240 {2800} bytes

File 1 Record 1
10240 Bytes